# How to set the chromaticity at transition

Christoph Montag

RHIC Retreat, July 10-13, 2006

- Chromaticity has to change sign around transition.

- Zero chromaticity at transition, when bunches are very short, causes fast transverse instability.

- Crossing zero just before transition, plus application of octupoles, avoids instability.

- γ_t jump causes $\approx +2$ units chromaticity jump. If chromaticity is still negative before the jump, it may jump right onto zero at transition.

- At the beginning of ramp development in each run, chromaticities are set to -2 before and $+2$ after transition $-$ and then they get adjusted.
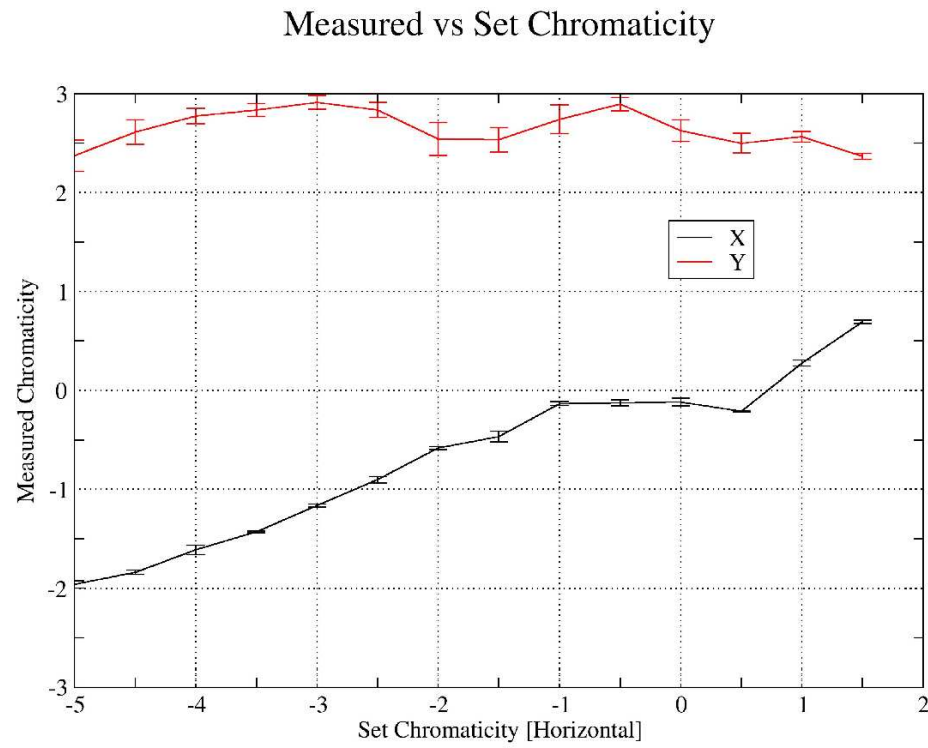
Chromaticity setpoints across transition, FY04 and FY05
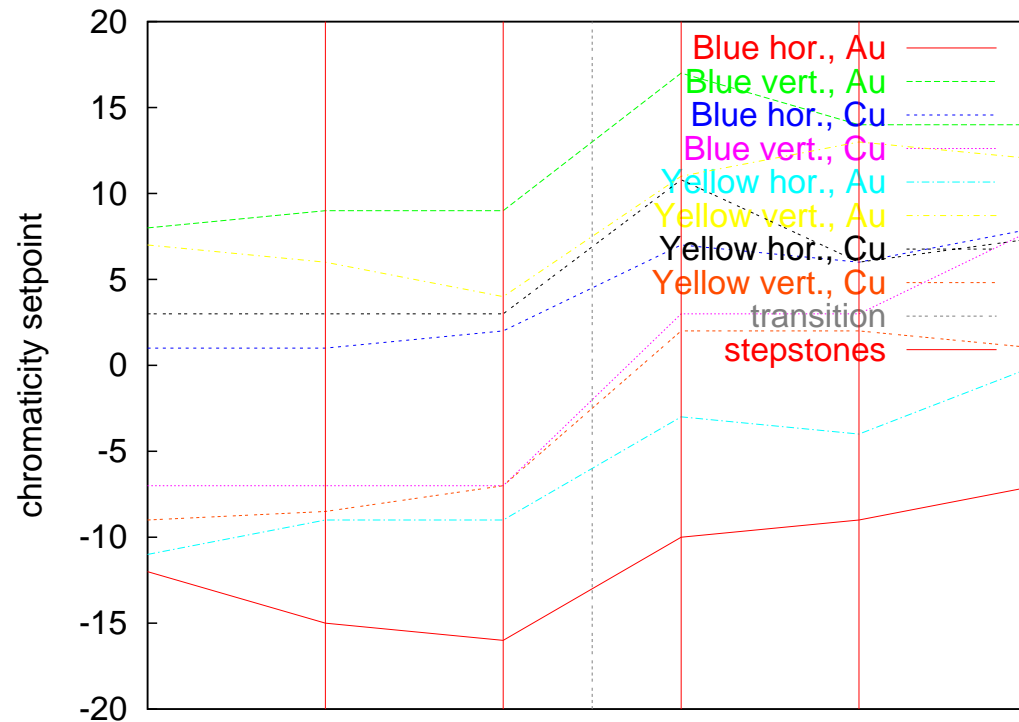
Chromaticity setpoints change $5 - 10$ units across transition; typical change: 8 units

Chromaticity change (setpoints) is twice as high as expected!

Measurement by Steve Tepikian:


Measured vs Set Chromaticity

**Chromaticity increments are factor 2 off!**

Recipe

- Start with chromaticity change (setpoints) of 8 units (instead of 4) across transition

- When adjusting chromaticity around transition, keep this increment constant.

- Decoupling at transition is important, since skew chromaticity may be zero.

This results in a one-parameter adjustment, namely the actual chromaticity around transition − and therefore the zero-crossing time:
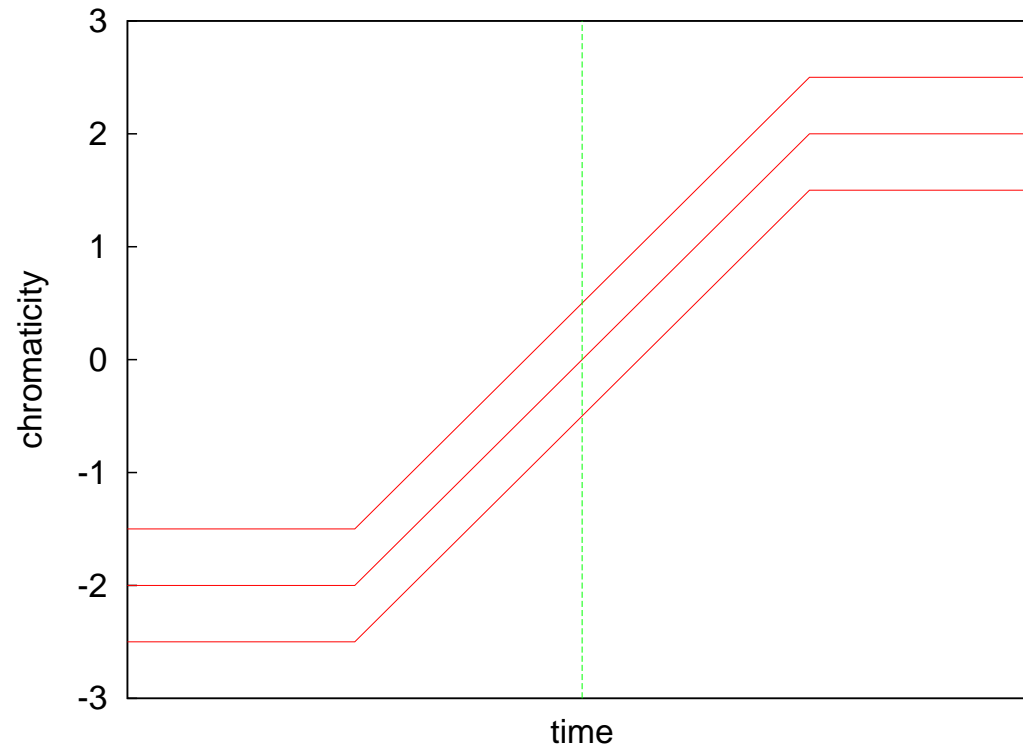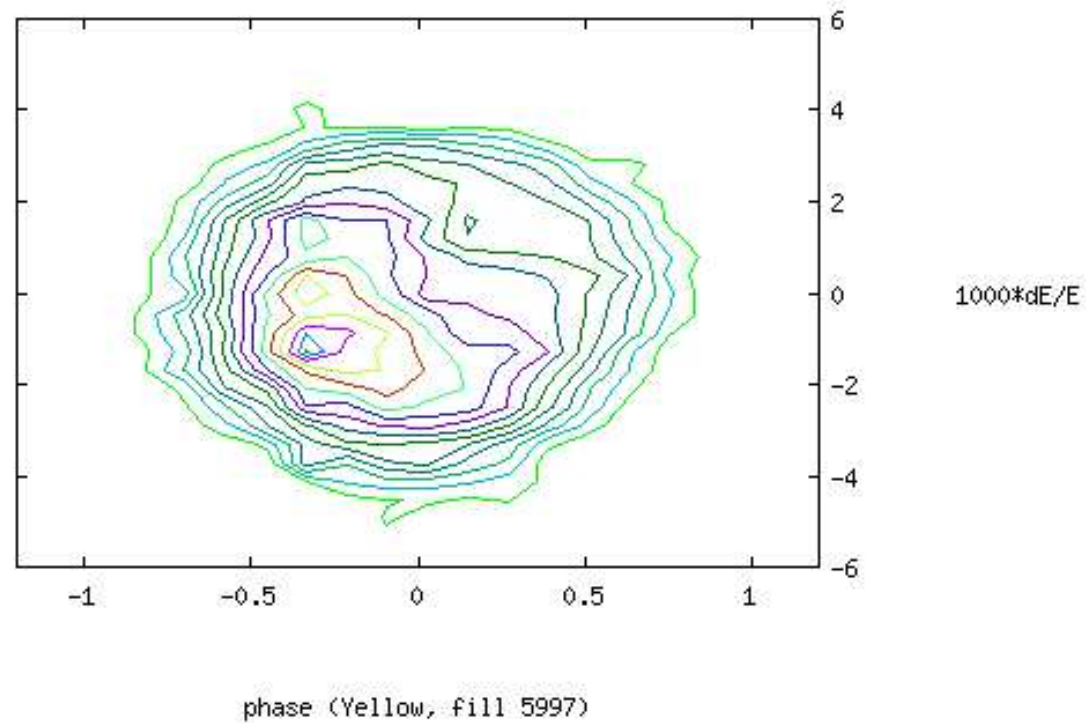
Diagnostics

- Chromaticity measurement along the ramp
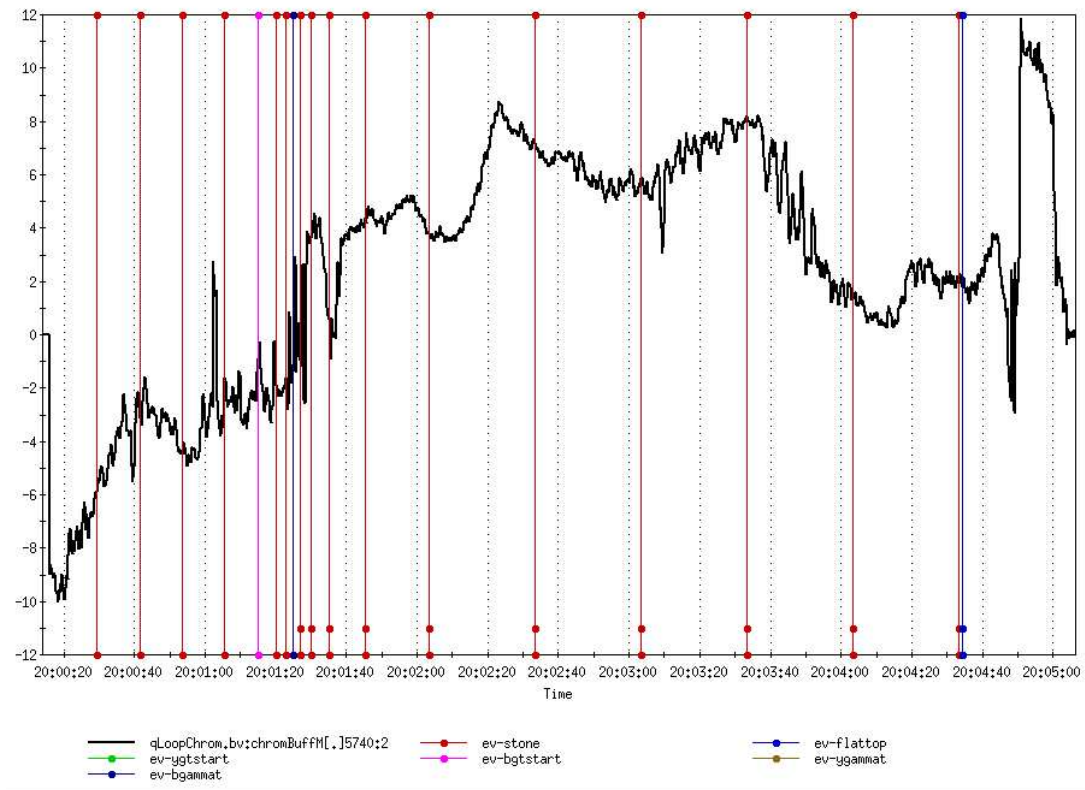
- Phase space tomography

- Coherence monitor